Material Composition And Reservoir Properties Of Terrigenous Deposits

Elleanora Narimanovna Yusupkhodzhaeva[1] — [1]Associate Professor of Tashkent State Technical University, Universitetskaya str. 2, Tashkent, Uzbekistan

Nargiza Utkurovna Batirova[1] — [1]Associate Professor of Tashkent State Technical University, Universitetskaya str. 2, Tashkent, Uzbekistan

Shokhodat Ruzimukhamedova[2] — [2]Doctoral student at the Institute of Labor Market Research, Tashkent, +998 91 162 62 33.

ABSTRACT

The article discusses the research work of a comprehensive analysis of the geological structure and oil and gas content of the southeastern part of the Chorzhui-Terrigen formation deposits and their prospects for the future. Based on the data obtained, recommendations are given for complex geological, geophysical and deep drilling operations.

Keywords: Traps, lithology, facies, formation, epoch, deposits, hydrocarbons, traps, oil and gas potential, capacity, complex.

Oil and gas in the operating fields of the southeastern regions of the Chorzhui range. Currently, the demand for hydrocarbons in Uzbekistan remains high. And this, in turn, requires a lot of effort and money. The discovery of new oil and gas fields can be achieved by accelerating the search and exploration of oil and gas products. The deposits and deposits discovered in 5 oil and gas bearing regions of Uzbekistan mainly belong to the Cenozoic and Mesozoic periods. It is known from world experience that a stream of hydrocarbons is extracted from terrigenous Jurassic sediments on an industrial scale. Studies conducted on the territory of Uzbekistan have shown that these deposits are considered promising. A deep and extensive study of the Jurassic Terrigenous period opens up new oil fields.

Based on the description of sedimentary layers by section, to characterize reservoir rocks of terrigenous Jurassic deposits and determine their lithological and facies characteristics of layers, conditions of formation and distribution of minerals found in them.

Before characterizing the reservoir rocks of terrigenous Jurassic deposits in the territory under consideration, it is necessary to focus on the main features of the geological structure, such as the facies composition (the studied deposits are represented by lake-marsh, continental, coastal-marine and marine facies), lithological composition (limestones, marls, mudstones, siltstones, sandstones, gravelites, breccias, and also coals), in sections: the upper part (clay, with limestone interlayers), higher in section (siltstones and sandstones, breccias and gravelites).

In the context of the southeastern part of the Chardzhou stage, the following formations are distinguished: Kimerek (Early Jurassic), Gurud (Aalen - early Bajos), Degibadam (late Bajos), Tangiduval (early -

Middle Bath), Baisun (late Bath-early Calloway) [1].

In the outcrops of the southwestern spur of the Hissar, the deposits of the Early Jurassic, distinguished as the Sanjar formation, are basal and lie with a sharp angular disagreement on the underlying formations. In the Kugitang section, the formation is represented by breccias, gravelites, sandstones, siltstones, mudstones, bauxite-like and carbonaceous rocks. The total power is up to 30-70m.

In the southeastern part of the Chardzhou stage, the deposits of the formation have a slight distribution, are confined to areas that experienced stable deflection in the Middle Jurassic and are developed in the middle parts of the deflections. It was discovered in the areas and deposits of Kimerek, Uchkyr, Uzunshor, Pamuk, Berdykuduk, Shurtan and a number of others. The formation with angular disagreement lies on the pre-Jurassic sediments. It is mainly represented by the rhythmic interlayer of mudstones, siltstones, sandstones, in some areas (Kimerek, Uchkyr) there are layers of gravelites [2].

Sandstones are multi-grained, gray, dark gray, polymictic, sometimes with glauconite, micaceous, carbonate-free, dense.

Siltstones are dark gray, clayey, micaceous, dense.

Mudstones are dark gray, often almost black, carbonaceous, sometimes there are thin layers of coals.

Gravelites occur in the form of lenses and thin layers. The clastic part is represented by fragments of quartz, feldspar, quartzite, siliceous-clay, rarely effusive rocks. Cement is mainly clay, less often carbonate-clay, siliceous-clay.

The reservoir rocks are sandstones and gravelites confined to the most submerged parts of the section. The open porosity sometimes reaches 15%, and the permeability varies from 0 to 326 mdarsi. Pores, in mainly primary, intergranular, irregular shapes due to poor sorting of terrigenous material.

Siltstones and mudstones are dense, sometimes slightly fractured, practically impermeable, which allows them to be considered potential tires.

The Middle Jurassic (Grudskaya formation) – in the outcrops in the stratotypic section of Kugitangtau is represented by sandstones, siltstones, mudstones and carbonaceous layers of floodplain-lake-marsh origin, at the base with basal rusticated conglomerates, gravelites and sandstones. The power of the formation varies between 300-320m [3].

In the Bukhara-Khiva region, deposits of the formation with angular or stratigraphic disagreement occur in the Paleozoic and according to the Kimerek formation.

They are represented by a rhythmic alternation of multi-grained sandstones, siltstones and clays, rarely coals, rarely gravelites.

Mudstones are dark gray, sometimes almost black, micaceous, non-carbonate, enriched to varying degrees with terrigenous material of siltstone dimension, with numerous remnants of carboniferous vegetation.

Siltstones of feldspar are quartz. Rocks are sometimes slightly fractured, gray, dark gray, non-carbonate, carbonaceous, with carboniferous plant detritus.

Sandstones are multi-grained, sometimes gravellite, gray, dark gray, less often brownish-gray, polymictic, with clay, less often carbonate-clay cement. In sandstones, millimeter-thick layers of clays and siltstones can sometimes be observed. Because in sediments, the bulk of sandstones is represented by fine-grained differences, whereas coarse-medium-grained ones occur in a subordinate value, rocks are characterized by relatively low reservoir properties and have low permeability at high porosity. The highest reservoir properties are possessed by multi-grained sandstones, which are mainly confined to the upper part of the section, where they can make up to 15-30% of the thickness of the formation. The open porosity is 10-15%, and the permeability is 1-10 mdarsi. The pores are small, intergranular, irregular in shape.

In the outcrops of the southwestern spur of the Hissar (Kugitang), the deposits of the Degibadam formation (J2b2 dg) are

represented by interlayers of sandstones, siltstones and mudstones with rare layers of coals and limestones. The upper boundary of the Degibadam formation is fixed by the find at the base the overlying Tangiduval formation of zonal ammonites of the lower Bath. The power of the suite is 150-200m.

In the BHR, the deposits of the formation in some areas (Bukhara stage, Kandym uplift, etc.) inconsistently lie on the pre-Jurassic formations and correspondingly overlap the deposits of the Gurud formation (Chardzhou stage, Beshkent trough, etc.) [4].

The formation is represented by continental and coastal marine facies.

The section is composed of multi-grained sandstones, siltstones, carbonaceous mudstones, calcareous clays and limestone interlayers are rarely observed. In the sections developed on the Spanish-Chandyr uplift and a number of areas of the Bukhara step, a pack of gravelites lies in the sole or inclusions of pebbles in clays are observed.

Coarse-grained rocks are gray, dark gray in color, sometimes pebbles are broken by cracks, pyrite often develops along the cracks. Clay cement, less often carbonate.

The sandstones are multi-grained, with a predominance of medium-grained differences. The rocks are gray, dark gray, light gray, polymictic, sometimes with glauconitis. The cement is clayey, carbonate-clay, rarely carbonate. A thin impregnation of pyrite is found in the mass of the rock.

Siltstones are gray, dark gray, sometimes greenish, often clayey, micaceous, often calcareous. There is an admixture of carboniferous plant detritus, as well as remnants of organisms of marine origin.

Mudstones and clays are gray, dark gray, often calcareous, less often carbonaceous, dense, often with an admixture (10-15%) of uncoated siltstone, less often sandy material.

The limestones are micrograined, clayey, sometimes silty-sandy, rarely organogenic-clastic. The rock is often recrystallized to form calcite, sometimes slightly fractured.

The permeable strata are mainly medium-grained sandstones, sometimes with an admixture of fragments of gravelite dimension. The proportion of reservoirs in the section is ≈25% of the thickness of the horizon. In most cases, the rocks are poorly permeable with an average porosity of up to 10%. The permeability does not exceed 5 mdarsi.

Siltstones are characterized by even lower values of filtration – capacitance properties (FES) – porosity ≈3-5%, permeability ≈1 mdarsi.

Fracturing is observed in mudstones and clays, as well as in carbonate rocks. The cracks are mostly mineral, some open (especially in carbonates). The open fracture porosity is ≈0.01-0.3%, the fracture permeability is ≈0.3-600 mdarsi.

In the reference section, the Tangiduval formation (J2bt1+2 tn) is represented by continental and shallow coastal–marine sediments - sandstones, siltstones, mudstones and limestones containing a complex of zonal ammonites of the lower and Middle Bath, generally characterizing the early and Middle Bath. The power of the suite is up to 80-90m. The deposits of the formation in the southeastern part of the Chardzhou stage are developed almost everywhere, with the exception of some territories of the Bukhara stage and small areas in the area of the Kandym uplift, according to the Degibadam formation and in some areas - inconsistently on the pre–Jurassic formations.

In general, it is possible to identify some patterns in the distribution of rocks. In the lower part, a sandy-mudstone stratum is developed, the middle one is represented by the interlayer of sandy-siltstone rocks with subordinate interlayers of mudstones and limestones, in the upper part, clay siltstones, clay, clay-carbonate rocks and micrograined limestones, often dolomitized, with organic residues, have been predominantly developed.

The rocks have good properties, the reservoirs are confined to multi–grained sandstones, the porosity of which, on average, reaches about 14-16%, and the permeability is up to 560 mdarsi. There is a pack of clays and clay siltstones in the roof of the suite, which can serve as a cover for collectors.

The Baisun formation (J2bt3-k1 bs) in the outcrops of the South Caucasus is divided into two bundles. The lower pack is composed of shallow coastal mudstones, siltstones and marls with interlayers of detrital detritus and oncolite-oolite limestones. Power up to 40-60m.

The upper one is characterized by the predominance of marls and clay limestones with layers of siltstones and mudstones up to 70-80 m thick.

The upper boundary of the formation, both in the outcrops of the southwestern spur of the Hissar and in the territory of the southeastern part of the Chardzhou stage, is clearly established by the change of the terrigenous strata by carbonate formations of the Early Callovian (Kandym formation (XVI).The total capacity of the suite is 110-120m.

The deposits of the formation in the southeastern part of the Chardzhou stage are developed everywhere, with the exception of sections in the north of the Bukhara stage, where the Jurassic sediments are wedged out. The formation lies according to the sediments of the Tangiduval formation, less often inconsistently on the Paleozoic complex of rocks. The section is dominated by clays, mudstones, marls, often calcareous with subordinate layers of sandstones, limestones are developed quite widely and are represented by pelitomorphic, sometimes organogenic-clastic differences.

All terrigenous rocks are enriched with calcareous material, interlayers of carbonaceous clays with carbonified plant detritus are observed. Reservoir rocks are unevenly distributed across the section [5].

In general, sandy-siltstone rocks are poorly sorted, often strongly clayey, open porosity is small 1-4%, permeability does not exceed 5 mdarsi.

In some areas, mainly in the southeastern part of the Chardzhou stage, there are interlayers of coarse-grained sandstones with high porosity of ≈10-15%, permeability of ≈520 mdarsi.

A pack of clay-carbonate rocks lies in the roof, which serves as a reliable cover for reservoirs developed in the sediments of the formation.

In general, it should be noted that reservoir rocks developed in terrigenous Jurassic sediments are composed of sandy – siltstone, less often coarse–grained formations characterized by heterogeneity of composition, structure and texture with intergranular porosity. Fractured clay-siltstone formations are rarely found, where permeability is due to fracturing.

In general, sand-siltstone reservoir rocks of the Jurassic TF in the territory under consideration are polymictic with a predominance of quartz-feldspar, in places quartz-glauconite differences.

The granulometric composition of sandy-siltstone sediments accumulated in marine conditions is characterized by a greater sorting of grains, they are often rolled and semi-rolled. Sandy-siltstone reservoir rocks formed under continental conditions are characterized mainly by poor sorting, fragments are often poorly rounded and have different shapes.

The lithological structure of the Jurassic terrigenous formations of the studied territory indicates that their formation took place under conditions of stable and different rates of deflection of the Pre-Jurassic surface, due to the predominance of relatively deep-sea sedimentation conditions. It should also be noted that in almost all horizons of the terrigenous formation, sandy reservoir rocks with a wide range of porosity and permeability values, as well as clay-bearing rocks, are developed.

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